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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
MARKHAM, WESLEY D	

ART UNIT	PAPER NUMBER
1762	

DATE MAILED: 11/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/840,552	DOPPER, GEBHARD
	Examiner	Art Unit
	Wesley D Markham	1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 September 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-5,7-20 and 24-33* is/are pending in the application.

4a) Of the above claim(s) *24-29* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-5,7-20 and 30-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 April 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. Acknowledgement is made of the amendment filed by the applicant on 9/17/2003 (with a certificate of mailing dated 9/16/2003) in which Claims 2 – 5, 7 – 16, 18, and 20 were amended, Claims 1 and 21 – 23 were canceled, and Claims 30 – 33 were added. Claims 2 – 5, 7 – 20, and 24 – 33 are currently pending in U.S. Application Serial No. 09/840,552, with Claims 24 – 29 being withdrawn pursuant to a restriction requirement, and an Office Action on the merits follows.

Drawings

2. The formal drawings (3 sheets, 4 figures) filed by the applicant on 4/23/2001 are accepted by the examiner.

Claim Objections

3. The objection to Claim 4, set forth in paragraph 4 of the previous Office Action, (i.e., the non-final Office Action, paper #17, mailed on 5/15/2003), is withdrawn in light of the applicant's amendment in which Claim 4 was amended, thereby rendering the objection moot.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. The rejection of Claim 2 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, set forth in paragraphs 7 – 8 of the previous Office Action, is withdrawn in light of the applicant's amendment in which Claim 2 was amended to recite that the outgoing flow of electrons is controlled via a switch at a given <u>switching</u> frequency.

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. The rejection of Claim 4 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement for containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention, set forth in paragraph 10 of the previous Office Action, is withdrawn in light of the applicant's amendment in which Claim 4 was amended to recite that the minimum switching frequency is "in a hertz range". This limitation is supported by the specification as originally filed (see, for example, page 7, line 2).

8. Claim 33 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim contains subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically, newly added Claim 33 requires that the method further comprise <u>continuously regulating</u> the switching frequency throughout the cleaning step and the part of the coating step. For support of this limitation, the applicant points to page 7, lines 7 – 17, especially lines 11 – 13, of the specification (see page 13 of the response filed on 9/17/2003). The cited portion of the specification discloses that the current path can be constantly switched, and the alternating switching can take place at a "possibly temporally variable frequency". However, after reviewing this portion of the specification, as well as the originally filed specification as a whole, the examiner notes that there is no disclosure or indication of continuously regulating the switching frequency throughout the cleaning step and a part of the coating step. The original disclosure that the constant switching can take place at a temporally (i.e., time) variable frequency is not sufficient to indicate to one skilled in the art that the applicant had possession of the subject matter of Claim 33 at the time the application was filed.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 2, 3, 7 – 12, 16, 18 – 20, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harvey et al. (GB 1 447 754 A) in view of Matthews (GB 2 323 855 A), and in further view of Welch (USPN 4,209,552).

11. Regarding independent Claim 2, Harvey et al. teaches a method for cleaning and coating a surface of an article having a metallic base body (page 2, lines 1 – 6 and 72 – 74, page 3, lines 51 – 57, and page 4, lines 27 – 33), the method comprising cleaning by generating a plasma with electrically positively charged ions, accelerating the ions towards the article, and bringing the ions into contact with the base body for cleaning the base body (page 2, lines 1 – 6, and page 3, lines 58 – 68), directing an electron beam of electrons onto the base body (page 2, lines 78 – 97), controlling the relative electric potential of the substrate (i.e., the base body), the electron source, and the anode so that the base body can be held at either a positive or negative electric potential (i.e., have either a positive or negative bias) depending on whether electron bombardment heating is desired (base body is relatively <u>positively</u> charged / biased) or ion bombardment cleaning is desired (base body is relatively <u>negatively</u> charged / biased so that the positive ions impinge upon the substrate) (page 2, lines 1 – 6 and 78 – 105, and page 3, lines 118 – 130), and coating the metallic base body (page 3, lines 51 – 57, and page 4, lines 27 – 33). Harvey et al. does not explicitly teach that the relative electric potentials are created

by controlling an outgoing flux of electrons coming into contact with the base body by connecting the base body to a reference potential via a switch at a given switching frequency (i.e., Harvey et al. do not explicitly teach the specific manner in which the relative electric potentials / biases are created / controlled). However, Matthews teaches a similar method / apparatus for cleaning and coating a metallic substrate in which a relative electric bias / potential is created by connecting the substrate to a pulsed D.C. power supply which alternates from positive to negative and thereby allows electron bombardment heating while the sample is positive and ion bombardment while the sample is negative (page 5, paragraph 1, page 8, paragraph 3, and page 9, paragraph 1). This is exactly the situation desired by Harvey et al. (i.e., the ability to switch relative substrate potentials depending on whether electron bombardment heating or ion bombardment cleaning is desired). Further, Matthews teaches that this alternating bias has the advantage of providing additional control of the coating microstructure in the subsequent coating step (page 9, paragraph 1). Therefore, it would have been obvious to one of ordinary skill in the art to utilize the alternating positive / negative substrate biasing process of Matthews in order to achieve the alternating heating / cleaning steps of Harvey et al. with the reasonable expectation of (1) success, as the processes and devices of Harvey et al. and Matthews are extremely similar, and (2) accomplishing the alternating positive / negative bias situation desired by Harvey et al. as well as providing additional control over the subsequent coating step. In addition, please note that by alternating from a negative substrate bias (i.e., a relatively high number of electrons

present in the substrate) to a positive substrate bias (i.e., a relatively low number of electrons present in the substrate), the number of electrons present in the base body must necessarily decrease (i.e., there is an outgoing flux of electrons present in the process of the combination of Harvey et al. and Matthews). The combination of Harvey et al. and Matthews does not explicitly teach that the "reference potential" (i.e., the (D.C.) power supply of Matthews) is connected to the base body via a switch at a given switching frequency. However, Welch teaches an ion bombardment cleaning process utilized prior to a coating process (i.e., a situation similar to that of both Harvey et al. and Matthews) in which the substrate is electrically connected to a D.C. power supply <u>via a switch</u> so that control over the degree of ion bombardment by application of any desired range of positive or negative voltages can be achieved (Col.4, lines 1 – 20). In other words, Welch teaches that a switch connected to a D.C. power supply can achieve the same objective as a pulsed (i.e., alternating) D.C. power supply (i.e., the embodiment taught by Matthews). Therefore, it would have been obvious to one of ordinary skill in the art to utilize a switch connected to a D.C. power supply (i.e., a "reference potential") in the process of the combination of Harvey et al. and Matthews instead of a pulsed D.C. power supply with the reasonable expectation of achieving similar results (i.e., high control over the ion bombardment cleaning and the ability to apply any range of negative and positive voltages to the substrate). One of ordinary skill in the art would have controlled the switch at a "given switching frequency", as required by Claim 2, of, for example, about one or two times per minute because Harvey et

al. teaches that such a switching frequency (i.e., between the electron bombardment heating and the sputter cleaning) is advantageous (page 2, lines 98 – 105). Regarding the newly added limitation that the cleaning step is continued during at least part of the coating step, Harvey et al. teaches that the apparatus of the invention is arranged so that the cleaning may be stopped as soon as the deposition starts (i.e., so that the argon ions do not form bubbles in the deposited coating), or the metal substrate may be heated to a higher temperature during the deposition (page 3, lines 45 – 50). In other words, Harvey et al. at least suggests that the cleaning can continue during the coating step, so long as the metal substrate temperature is high enough (i.e., above 300° C). Additionally, Matthews teaches that the alternating electron bombardment and ion bombardment of the growing films offers additional control over the coating microstructure (page 9, lines 1 – 5). In other words, Matthews teaches that continuing the cleaning (i.e., ion bombardment) during the coating step is advantageous. Therefore, it would have been obvious to one of ordinary skill in the art to continue the cleaning during at least a part of the coating step, as suggested by Harvey et al. and Matthews, with the reasonable expectation of successfully and advantageously providing additional control over the coating microstructure. Regarding the limitation that the switching frequency is selected from the group consisting of "an adjustable frequency" and "a regulated frequency". This limitation is met by Harvey et al. Specifically, Harvey et al. teaches that the switching frequency can be about one or two times per minute, although shorter or longer periods can be used (page 2, lines 98 – 105). As such, it is clear that the frequency

of Harvey et al. can be adjusted as desired by the purveyor in the art (i.e., it is adjustable) and/or regulated (i.e., so that it is maintained at about one or two times per minute). *Importantly, please note that no actual frequency adjusting or regulating step is claimed by the applicant.*

12. The combination of Harvey et al., Matthews, and Welch also teaches all the limitations of Claims 3, 7 – 12, 16, 18 – 20, and 30 as set forth above in paragraph 11 and below, including a method wherein / further comprising:

- Claim 3 – Alternately opening and closing the switch to define an outgoing flux of the electrons in an electric outgoing line connected to the base body (see paragraph 11 above, Figure 1 of Matthews, and Figure 2 of Welch, which both show the substrate connected to an outgoing electric line).
- Claim 7 – The flux of electrons is controlled such that a bias voltage of substantially between 100 V and 1000 V is established between the plasma and the base body (page 3, lines 119 – 130 of Harvey et al.).
- Claim 8 – Determining a bias voltage between the electrically positively charged ions of the plasma and the base body (page 3, lines 119 – 130 of Harvey et al.).
- Claim 9 – The plasma is generated with the electron beam. Specifically, Harvey et al. teaches that the electron filament source can be used to both heat the substrate by electron bombardment and generate the plasma (i.e., the "glow discharge") (page 1, lines 83 – 87, and page 2, lines 78 – 91).

- Claims 10 – 12 and 30 – The plasma is formed with a gas, specifically an inert gas, specifically a noble gas, specifically argon (page 2, lines 1 – 10 of Harvey et al.).
- Claim 16 - Concurrently with cleaning the article, heating the article to "a coating temperature". Specifically, Harvey et al. teaches alternately heating and cleaning (page 2, lines 98 – 105). The substrate may also be heated by the ion bombardment of the cleaning (page 2, lines 78 – 80). In addition, the applicant's claim simply recites heating the article to "a coating temperature" (i.e., not a specific coating temperature or a coating temperature utilized in a subsequent coating step), and therefore Harvey et al.'s teaching of heating in general reads on heating to "a coating temperature" (i.e., any temperature).
- Claims 18 – 19 – The article is a gas turbine component (Claim 18), specifically a turbine blade or a heat shield (Claim 19). Harvey et al. teaches a turbine blade (page 2, line 74).
- Claim 20 – Rotating the article about an axis of rotation (page 2, lines 106 – 113, and page 3, lines 81 – 83 of Harvey et al.).

13. Claims 4, 5, 32, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harvey et al. (GB 1 447 754 A) in view of Matthews (GB 2 323 855 A), in further view of Welch (USPN 4,209,552), and in further view of Goedicke et al. (WO 97/22988 A1). Please note that, since the Goedicke et al. document published in German, USPN 6,083,356 (which is the equivalent U.S. National Stage Application

(i.e., the "371" application)) is being used as an effective English language translation.

14. The combination of Harvey et al., Matthews, and Welch teaches all the limitations of Claims 4, 5, and 32 as set forth above in paragraphs 11 – 12, except a process wherein (1) the switching frequency is adjusted to a maximum of 27 MHz (Claim 32), (2) the switching frequency is in a range from a minimum in the hertz range to a maximum of 27 MHz (Claim 4), and (3) the switching frequency is substantially 50 KHz (Claim 5). Specifically, Harvey et al. teaches a switching frequency of about one or two times per minute (page 2, lines 103 – 104). However, Harvey et al. also teaches that <u>shorter periods can be used</u> (page 2, lines 98 – 105). In other words, Harvey et al. teaches that the switching frequency between electron bombardment heating and ion bombardment / plasma cleaning can vary and be chosen by a purveyor in the art. No upper or lower limits of this frequency appear to be set by Harvey et al. In addition, Goedicke et al. teaches a method of pre-treating substrate surfaces for a subsequent coating step, the pre-treating method comprising alternating the polarity of the substrate in a vacuum chamber in order to <u>alternate / switch between electron bombardment and ion bombardment of the substrate</u> in a glow discharge (i.e., a process analogous to that of the combination of Harvey et al., Matthews, and Welch) (Abstract, Col.2, lines 53 – 67, Col.3, lines 1 – 22, and Col.4, lines 9 – 15). Goedicke et al. teaches that the switching frequency should be set in the range of between <u>1 Hz to 1000 kHz, preferably between 20 and 50 Hz</u> (Abstract and Col.3, lines 3 – 9). Therefore, it would have been obvious to one of ordinary skill

in the art to utilize a switching frequency in the range taught by Goedicke et al. as the switching frequency of the combination of Harvey et al., Matthews, and Welch with the reasonable expectation of (1) success, as Goedicke et al. teaches that utilizing such an electron bombardment / ion bombardment switching frequency to pre-treat a substrate can be successfully performed, and (2) obtaining similar results when compared to using the switching frequency taught by Harvey et al. (i.e., similarly cleaning and heating the substrate prior to depositing a coating on the substrate). Please note that the switching frequency values taught by Goedicke et al. lie within the switching frequency values claimed by the applicant in Claim 32, overlap the switching frequency values claimed in Claim 4, and encompass the switching frequency value claimed in Claim 5. In the case where the claimed ranges overlap or lie inside ranges disclosed by the prior art, a *prima facie* case of obviousness exists (*In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)).

15. The combination of Harvey et al., Matthews, and Welch teaches all the limitations of Claim 33 as set forth above in paragraphs 11 – 12, except a process that further comprises <u>continuously regulating</u> the switching frequency throughout the cleaning step and the part of the coating step. However, as set forth above in paragraph 14, Goedicke et al. teaches a method of pre-treating substrate surfaces for a subsequent coating step, the pre-treating method comprising alternating the polarity of the substrate in a vacuum chamber in order to alternate / switch between electron bombardment and ion bombardment of the substrate in a glow discharge (i.e., a

process analogous to that of the combination of Harvey et al., Matthews, and Welch) (Abstract, Col.2, lines 53 – 67, Col.3, lines 1 – 22, and Col.4, lines 9 – 15). Further, Goedicke et al. teaches that the alternating substrate polarity (i.e., the switching frequency) can be individually controlled (Col.3, lines 3 – 9). Therefore, it would have been obvious to one of ordinary skill in the art to continuously control (i.e., regulate) the switching frequency of the combination of Harvey et al., Matthews, and Welch throughout the entire period of time that the switching is performed (i.e., throughout the cleaning / preheating process and the coating process – see paragraph 11 above) with the reasonable expectation of (1) success, as Goedicke et al. teaches that such a variable can be controlled, and (2) insuring that the desired switching frequency is maintained throughout the entire process.

16. Claims 13 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harvey et al. (GB 1 447 754 A) in view of Matthews (GB 2 323 855 A), in further view of Welch (USPN 4,209,552), and in further view of Rickerby (USPN 5,652,044).
17. The combination of Harvey et al., Matthews, and Welch teaches all the limitations of Claims 13 and 31 as set forth above in paragraphs 11 – 12, except for a method wherein the plasma is formed with a reactive gas, particularly hydrogen. Specifically, Harvey et al. teaches forming the plasma with argon for the ion cleaning process (page 2, lines 1 – 10). Rickerby teaches that, in the art of ion / plasma cleaning of turbine blades prior to coating (i.e., a process analogous to that of both Harvey et al. and Matthews), the use of an argon-<u>hydrogen</u> plasma may be used to provide

enhanced cleaning when compared with an argon plasma alone because the additional hydrogen ions chemically react with undesired contaminants on the substrate (Col.10, lines 16 – 35). Therefore, it would have been obvious to one of ordinary skill in the art to utilize an argon-hydrogen plasma (i.e., a plasma formed with the reactive gas hydrogen) as taught by Rickerby in the process of the combination of Harvey et al., Matthews, and Welch with the reasonable expectation of (1) success, as Rickerby teaches a process analogous to that of both Harvey et al. and Matthews, and (2) obtaining the benefits of using the argon-hydrogen plasma of Rickerby as opposed to the argon plasma of Harvey et al., such as enhanced cleaning of the substrate because the additional hydrogen ions chemically react with undesired contaminants on the substrate.

18. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harvey et al. (GB 1 447 754 A) in view of Matthews (GB 2 323 855 A), in further view of Welch (USPN 4,209,552), and in further view Wright et al. (USPN 4,090,941).

19. The combination of Harvey et al., Matthews, and Welch teaches all the limitations of Claim 14 and 15 as set forth above in paragraphs 11 – 12, except for a method comprising initially <u>heating the article without a gas for forming a plasma</u> and then adding the gas for forming the plasma (Claim 14), particularly heating the article by irradiation with the electrons (Claim 15). However, Harvey et al. does teach alternately heating and cleaning the article (page 2, lines 98 – 105), which

reasonably suggests a cycle of heating – cleaning – heating – cleaning – etc. Wright et al. teaches that, in the art of electron bombardment heating and ion bombardment cleaning of a turbine blade prior to coating (i.e., a process analogous to that of Harvey et al.), it is desirable to first heat the substrate by electron bombardment to a preferred temperature, and then sputter clean the surface through argon ion bombardment (Col.3, lines 61 – 68, and Col.4, lines 1 – 6 and 22 – 37). Additionally, Matthews teaches that such electron bombardment heating can be carried out in an evacuated vacuum chamber without raising the chamber pressure by admitting argon gas (i.e., the heating can be performed without a gas for forming a plasma) (page 5, paragraph 3, and page 6, paragraph 2). Therefore, it would have been obvious to one of ordinary skill in the art to perform the electron bombardment heating portion of the heating / cleaning cycle of Harvey et al. first, as taught by Wright et al., without a gas for forming the plasma, as taught by Matthews, and then adding the gas (i.e., argon) for forming the plasma, with the reasonable expectation of (1) success, as Matthews teaches that electron bombardment heating can be carried out in an evacuated vacuum chamber without raising the chamber pressure by admitting argon gas, and (2) obtaining the benefits of not using a gas such as argon in the first heating portion of the heating / cleaning cycle of Harvey et al., such as reducing the amount of gas utilized / required in the process, thereby reducing processing costs.

20. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harvey et al. (GB 1 447 754 A) in view of Matthews (GB 2 323 855 A), in further view of Welch (USPN 4,209,552), and in further view of Frye et al. (USPN 4,380,865).

21. The combination of Harvey et al., Matthews, and Welch teaches all the limitations of Claim 17 as set forth above in paragraphs 11 – 12, except for a method wherein, during the alternating heating / cleaning steps of Harvey et al. and prior to the coating step of Harvey et al., the article is heated to a temperature of over 800° C. Please note that that Harvey et al. does teach a coating temperature of above 800° C (page 2, lines 69 – 77). Harvey et al. is silent as to the temperature utilized during the alternating heating / cleaning steps prior to the coating step. However, Harvey et al. does teach utilizing argon ion cleaning of the substrate (which alternates with electron bombardment heating) prior to an electron beam coating step (page 2, lines 1 – 10 and 98 – 105, and page 3, lines 1 – 38). Since Harvey et al. is silent as to the temperature utilized during the heating / cleaning cycle(s), one of ordinary skill in the art would have been motivated to utilize an operable argon ion cleaning / heating temperature in the process of Harvey et al. Frye et al. teaches that a suitable temperature utilized during an argon ion cleaning process is 850° C (Col.8, lines 55 – 58). It would have been obvious to one of ordinary skill in the art to utilize this temperature during the heating / cleaning cycle of Harvey et al. with the reasonable expectation of success, as (1) Harvey et al. teaches argon ion cleaning and Frye et al. teaches that argon ion cleaning can be achieved at a substrate temperature of 850° C, and (2) Harvey et al. teach that the substrate of their process can withstand

temperatures of above 850° C (i.e., up to at least 1200° C) (page 2, lines 75 – 77). Further, one of ordinary skill in the art would have been motivated to utilize this substrate temperature since Harvey et al. is silent as to the substrate temperature during the heating / cleaning process and Frye et al. teaches an operable substrate temperature.

Response to Arguments

22. Applicant's arguments filed on 9/17/2003 have been fully considered but they are not persuasive.

23. First, the applicant argues that Harvey et al. teaches that the cleaning effect is stopped during the coating step, and amended Claim 2 requires continuing the cleaning step during at least a part of the coating step. In response to applicant's arguments against the Harvey et al. reference individually, one cannot show non-obviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Additionally, Harvey et al. teaches that the apparatus of the invention is arranged so that the cleaning <u>may</u> be stopped as soon as the deposition starts (i.e., so that the argon ions do not form bubbles in the deposited coating), <u>or</u> the metal substrate may be heated to a higher temperature during the deposition (page 3, lines 45 – 50). In other words, Harvey et al. at least suggests that the cleaning can continue during the coating step, so long as the metal substrate temperature is high enough (i.e., above

300° C). Further, Matthews teaches that the alternating electron bombardment and ion bombardment of the growing films offers additional control over the coating microstructure (page 9, lines 1 – 5). In other words, Matthews teaches that continuing the cleaning (i.e., ion bombardment) during the coating step is advantageous.

24. Second, the applicant argues that Harvey et al. uses a given, set frequency in a range throughout the heating, while the instant application calls for the frequency to be an "adjustable frequency" or a "regulated frequency". The applicant then states that a regulated frequency means that the process of cleaning / heating is controlled and the frequency is changed according to this anytime as necessary. In response, the examiner notes that the applicant's argued definition of a "regulated frequency" appears to be overly narrow. For example, Claim 2 only requires an "adjustable frequency" or a "regulated frequency". This does not require or imply that the frequency is changed at anytime during the process, as argued by the applicant. In other words, a variable can be "regulated" without being changed or altered. Further, Harvey et al. teaches that the switching frequency can be about one or two times per minute, <u>although shorter or longer periods can be used</u> (page 2, lines 98 – 105). As such, it is clear that the frequency of Harvey et al. can be adjusted as desired by the purveyor in the art (i.e., it is adjustable) and/or regulated (i.e., so that it is maintained at about one or two times per minute). In other words, the frequency of Harvey et al. is maintained (i.e., "regulated") at a desired value (i.e., one or two times per minute).

Importantly, please note that no actual frequency adjusting or regulating step is claimed by the applicant.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D Markham whose telephone number is (703) 308-7557. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

WDM

WDM

Wesley D Markham
Examiner
Art Unit 1762

MICHAEL BARR
PRIMARY EXAMINER